

Abstract

The direct path of a radio signal from transmitter to receiver is frequently interfered with by reflections of the signal from stationary and moving objects. This is called multipath noise. This invention utilizes a new adaptive filter technique to reduce multipath noise. A nonlinear least squares method measures the delay, Doppler shift and amplitude of the multipath due to each object and subtracts a very accurate reconstruction of each multipath signal from the noisy signal. If an object is a target, its range, range rate and magnitude is got from the measured multipath delay, Doppler shift and amplitude. Position and velocity of the target can be obtained by geometric triangulation with multiple transmitters. Target angle can be measured by the relative phase of the corresponding filter coefficients across multiple antennas. The system can be used on a surveillance aircraft to cancel ground reflections and measure targets.